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MANAGEMENT DISCUSSION SECTION

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

Agenda

- My name is Jimmy Glotfelty, and I am the United States lead for the Joint US-Canada Power System Outage Task Force
- First of all, I want to thank you all for being here today to help us to do our process of investigating the August 14 blackout in a thorough and complete manner
- Few things, let me give you a kind of, sense of the day, first
    - o I am going to give a couple of remarks
    - o My counterpart Dr. Nawal Kamel from Canada will give a few remarks
    - o We'll ask a couple others up here to say a few words
    - o And then we will turn it over to our meeting facilitator, Rich Scheer, who is sitting down here in front, who will walk you through the process
    - o We do not have that many people who have signed up to speak today
        - So, this may be quicker than we anticipated
            - But we encourage all of those who have something to say to use this opportunity as well as the other opportunity of either submitting paper comments or electronic comments to do so

Blackout Investigation

- Your comments are very important as we try to complete our investigation
- We are trying to have a complete and thorough and concise investigation to determine:

- What caused the blackout
- And make sure that all of our facts are absolutely accurate

Public Recommendations

- This is an opportunity for the public to give us their thoughts to ensure that we do have the actual facts
  - And then, I think, the most important part is recommendations that would help reduce the likelihood that this would happen again in this region of the country in Canada as well as other regions of the country

Phase 2

- It's critical that we use this opportunity in Phase 2 of our investigation to address the real issues that are critical for ensuring a reliable electric system across the United States and Canada
  - These opportunities don't come along too often
    - And let's hope they don't come along too often in the future
  - But we should use it for what it is
    - And we hope to have a list of maybe some policy, a lot of technical recommendations, when our final report is completed sometime early next year

Types of Recommendations

- A couple of things that from our perspective that we think are critical in the types of recommendations that we would like to hear
- Of course, we are open to all sorts of recommendations, but if there are specific actions that:
  - Utilities
  - Transmission owners
  - And operators or generators
  - Reliability organizations
  - Or other entities
    - Should take in order to ensure that we have the most reliable grid transmission system, wholesale electric power system going forward

Minimizing the Spread of Blackout

- Our actions that might have been taken or types of programs, load shedding programs or things like that
  - That might have helped reduce the scope of this blackout that we would like to consider and if you all have comments on those
    - We would be eager to hear them
  - Secondly, are there comments or recommendations on ways that we could have – that the system could have inhibited the spread of this blackout if it was localized or if it was in a smaller region are there are recommendations that we might consider going forward that would minimize the spread of blackouts as they do happen in the future
  - We know that what we are trying to do is minimize the likelihood
  - We can't ever prevent, but we'll do the best that we can

Moving to a More Reliable Transmission System

- And finally, other things that the federal government, the regulatory or reliability organizations, or state regulatory entities
  - Should take in order to make this system work together or are there mechanisms that need to be created that will ensure that our organizations work better
  - Both state and Federal, and that we get to the – get the issues that we need resolved, on the table resolved
    - And we can move forward to a more reliable transmission system
  - We really do hope that this opportunity is taken by as many as – we hope that as many of you all take this opportunity to give comments

Secretary and the National Resources Minister in Canada's Commitment to the Public

- We committed, both the Secretary and the National Resources Minister in Canada committed to an open and public process
  - To ensure that our report – our final report is accurate
  - That everybody has the opportunity to comment and everybody has the opportunity for input
    - And this as well as our meeting tomorrow in New York City and on Monday in Toronto are those formal opportunities here face-to-face, there will be more in the future
    - But we hope that you will take this opportunity today to give us your thoughts
- I'd now turn it over to Dr. Kamel for a few words and then we'll have a couple of more comments

Dr. Nawal Kamel, Special Advisor to the Deputy Minister, Natural Resources Canada

Introduction

- Yes, good morning everyone
- My name is Nawal Kamel, and I am the Canadian colleague of the Task Force
- I would like to join my voice to that of my colleagues this morning

Appreciation of Public Interest

- First of all, thank you very much for your efforts so far and thank you in advance for your contributions
- We really appreciate it very much
- We appreciate your interest and your concern in helping us addressing these issues
  - And we will also appreciate any comments or suggestions or recommendation you might want to bring
  - We will reflect upon your comments
  - And we will continue to work with our experts and with the members of this three working groups
    - And all of these will be very considered inputs that we will take thoroughly into account as we together formulate the recommendations that will be put forward early next year

- We hope that with all our efforts together, we'll be able actually to formulate recommendations that will make a difference
    - And that will help us minimize the risk of any such occurrence in the future and most importantly
        - To reassure the citizens on both sides of the border that these things have been thoroughly studied and that action that is needed has been taken

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

Introduction

- One thing that I would like to do before we get started on other comments is
    - I will ask Dr. Kamel to introduce her folks from Canada who are here
    - And I will take the opportunity now to introduce the US side, just so you all know who you are speaking to
    - Again my name is Jimmy Glotfelty, this is David Meyer from Department of Energy
        - The Blackout System Working Group co-chairman
    - Alison Silverstein from the Federal Energy Regulatory Commission, Electric System Working Group co-chair
    - Joe Eto is one of our investigators from Lawrence Berkeley Laboratory, and is a transmission expert
    - Alan Schriber is the Chairman of the Public Utility Commission here in Ohio
        - And is an Electric System Working Group member
    - Down on the far end, we have John Overly from the Department of Homeland Security
        - Who represents our security working group co-chairman Bob Liscouski
    - Oh, I am sorry and Corney Holden from the Nuclear Regulatory Commission who represents Chairman Nils Diaz
        - And Kenneth Haase from New York Power Authority

Thomas Rusnov, Electric System Working Group Co-Chairman

- I will introduce myself, I am Tom Rusnov, I am on special assignment to Natural Resources Canada and Special Advisor for this investigation

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

- I think what we would like to do now is for the leaders of the working group, the three working group co-chair's – anything to say from Electric System or …?

Thomas Rusnov, Electric System Working Group Co-Chairman

- I think Jimmy you've covered this very well
- Thank you

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

- I think the one thing that we would like to do is since we are here in Ohio is give Alan Schriber an opportunity to say a few words on behalf of the Commission as well as the government here in Ohio

Alan Schriber, Chairman, Public Utility Commission of Ohio

Views on behalf of the Commission and the Governor

Modernization Plans

- I will do so as long as I can be of value
- I think I can say that I accurately represent the views of the governor and both he and I were intimately involved and have been intimately involved in observing the process
    - Taking us through the events of August 14
    - And I do want to express my gratitude for the opportunity to be a member of the working group
        - And Jimmy and David and Alison, thank you for keeping me engaged
    - It's been a really good process and the document that it produced at this point I thought was a great lead
        - And it really was, it was educational, it was really good and I do appreciate being a part of that
- In our own world that we operate in, we have a lot of techno-babble
    - But I think at the end of the day the governor probably said it best when he testified that in the 21st century a system that relies on courtesy calls is clearly outdated and must be modernized
    - And I think that's what comes out at least to me in the report above all else
    - And I will note that shortly, well, within hours after the interim report was released

Filings with The PUCO

- I received a letter from the governor directing myself from PUCO and one of my colleagues, Clarence Rogers
    - Who is with us today to push FirstEnergy into evaluating and perhaps correcting the deficiencies that they have in their energy management system and with that we ordered the company to file with the PUCO by the beginning of March
    - A mitigation plan and through the good graces of Merit
        - We will have their expertise to help us evaluate that
    - Because clearly within our state, we don't have the kind of technical capability that you all have and they have agreed to lend us support in that evaluation, so we are moving along those fronts
    - I don't think it is, I would speak any further with respect to Merit because we never know what conditions may be from proceeding in the future
    - So, I think I'll stop there
- I think my voice is going to stop me anyway, again thank you for the opportunity to be here
    - Welcome to Cleveland and Ohio and I am sure as always we will have some good comments from Clevelanders

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

- Thank you Mr. Chairman
- Now, I'll turn it over to over Rich Scheer, our facilitator, to brief you on how we are going to work today and then we'll start calling the speakers

Rich Scheer, Conference Facilitator

Ways for Panelist to Provide Inputs

- There are a number of ways for you to provide input and maybe I will run through those real quickly
    - There was a piece of paper that you might have picked up from the desk
        - But one of which is by mail, there is some snail mail addresses at the Department of Energy and in Canada that you can send your comments, written comments
        - So, that's one way to do it
    - A second way to do it is via e-mail
        - There is a couple of e-mail addresses to comment on that sheet of paper
        - One in the Department of Energy
        - And one in Canada for you to e-mail your comments
    - A third way to do it is through a couple of onsite computer workstations that we have sitting right outside the door
        - Where if you wish, if you're too shy to get up here and offer your oral comments to our distinguished panel, you could very quietly type them up
        - We have two workstations right outside the door to your right
    - And then the final way obviously is to offer your oral comments and we have got some ground rules that we'd like to follow in how we do that
    - We want to make sure that everybody has a fair opportunity, but first and foremost is that we are not here in a question and answer session with our panelists
    - They have come here with their ears wide open and their minds open and sitting there ready to listen to you
    - So, there won't be an opportunity for give and take with the panel today

Ground Rules

- They are – we want to spend all the time that we can listening to what you have to offer
    - So, that's the first ground rule
    - And if I need to I'll stand up and make sure that ground rule is being obeyed
    - The second ground rule is that you need to register in order to have an opportunity to speak
    - If you haven't done so already, all you have to do is go outside, put your name on the list
        - And you will get a number and so we are going to operate deli counter style
    - I'm going to call a number and the person with that number is going to come up and hand me their card and then have an opportunity to speak into the microphone
        - Which leads me to my final ground rule and that has to do with just the timing of your comments

Time Limit

- We would like to limit them to five minutes and I have got this very onerous egg timer here that I plan to use in order to make sure that we stay on time
    - But since I don't think we're overwhelmed with signups for talking, if you wish, you can after you finish your five minutes
        - You can go out and register again, and time permitting, have an opportunity to get a second five minutes

- So, that opportunity is available to you as well
- So, with that, that's the extent of the ground rules that we're going to be following and so, I'd like to call number one, front center to have their chance of five minutes of fame
- And if you could give your name and if you're representing an organization
  - Let the panelist know who you are so it will be helpful

Various unidentified speakers

- [Editor's note: off-microphone discussions: 14:52-15:15]

Richard Schultz, VP of Planning, International Transmission Company

Commending the Efforts of Task Force

- I really appreciate the opportunity to speak today
- I'd like to commend the Task Force on their hard work on a difficult subject
  - A substantial portion of our ITC planning, engineering, and operating staff has been consumed by participation on this Task Force
  - As well as gathering and supplying information requested by the Task Force

ITC Captures Operations in Michigan on August 14

- ITC operates Michigan 's MECS –Michigan Electric Control Area in conjunction with METC
  - Which is Michigan Electric Transmission Company on behalf of Consumers Energy and Detroit Edison
  - As a result, in that world, we have certain data collection apparatus in place
  - We call them DSL [Disturbance Storage and Logger] loggers, which captured the events that occurred in Michigan on an externally consistent two second-time interval basis on August 14
  - This includes power flows into and out of Michigan, key power flows within Michigan, and the output of generating units
  - This information allowed us to quickly determine what happened to Michigan on August 14
  - We made the initial determination on Friday the 15th, confirmed with additional Michigan data as well as Detroit Edison data on the 16th and reported the findings and the data to NERC and ECAR on Sunday the 17th, and the Michigan regulators and to authorities and ECAR executives on the 18th

Surge in Power in Michigan and its Impact

- The main findings from our perspective at that time were that at approximately 16:09
  - A substantial surge in power came into the Southeastern Michigan side
  - I think it is from AEP and MISO all across the state and then back down to the southeast side with FirstEnergy
  - A lesser surge of power at that time simultaneously came across into Michigan from Ontario and into Ohio
  - The west-to-east power surge caused the voltage on the eastern end of the cross-state Michigan 345 kV ties to drop precipitously as the company reacted to power

demands imposed by this power surge, exceeded any comparable power supply at the eastern end of these lines

Incremental Power Requirements Tripped 15 Generating Units

- Parenthetically, we will note that the incremental requirements on just one of our lines was determined to be 2,800 MW
  - Which is an enormous amount of reactive requirement just to supply the reactive loss in one line
- Two multiple unit power plants connected near the eastern end of the power surge were unable to operate under these conditions
  - And the 15 generating units tripped one after another over a period of several seconds up to a minute
  - This collapsed voltage further in that area and the 345 kV lines were ultimately opened by protective relaying, which perceives such conditions as faults or short circuits
  - The cutting of that west-to-east path to the power, left only the Ontario interconnection as the path for it to continue to go into Ohio, which then increased correspondingly to compensate – further degrading the remaining Michigan transmission pattern
  - This sequence of events flowed into western Michigan from the south into eastern Michigan from the east and then into Ohio to the south
    - And the flow from the Midland facility are shown on the plot where the simultaneousity of these events is apparent
  - The plot also shows the substantial pickup in flow from Ontario as the west-east path was cut

Detroit Edison Generators Tripped

- Detroit Edison generators tripped following the second surge
  - I have also included Michigan frequency, voltage and VAR Bode plots
    - Which illustrate the absolute operational stability within Michigan throughout the day until the immense power surge flowed across the state
  - The power to the VAR plot, which I included also is consistent with and supportive of those observations
  - We have reviewed the report
  - Am I out of time?

Rich Scheer, Conference Facilitator

- Since we don't have that many, why don't you keep going for maybe another 10 minutes

Richard Schultz, VP of Planning, International Transmission Company

Report Review

- We have reviewed the report – this is really the thrust of my comment
  - And we agree with many, but not all of the findings on our observations and those of the MPSC, Michigan Public Service Commission of Michigan
  - Most of the problems occur in the section occurring after 16:06

- In particular, some of the data which ITC has supplied appears not to have been incorporated, notwithstanding our supply of such data at the earliest date
    - It's especially important that flow information be utilized where available
    - Such flow data is available and is provided for Michigan systems

Understanding the Real Problem of the Power Surge

- Power flows occur in accordance with certain fundamental electrical laws such as Kirchhoff's Current Law, which remains cohesive, when other data may be disjointed
    - Notwithstanding the above, the report seems to indicate the power surge was in reaction to Michigan units going offline when those events clearly occurred following the power swing
    - The report also states that there was no voltage collapse, in fact, we saw voltages as low as 23% on some of our lines prior to the trip of the cross state lines
    - I make these remarks because of an overwhelming condition that a problem will not be solved, unless the problem is completely and accurately understood
    - An inaccurate understanding will lead to the potential for future problems

David Fuller, Chief Technical Officer at Systems Division, Aeroflex

Major Causes

Control System

- The report is interesting, and the major problem was in the control system and the situational awareness of the operators
- Looking at the report and the situation that occurred
    - It is my belief there is a fundamental flaw in the monitoring and control system that is in place throughout the control of the grid
    - The data monitoring and control system operates in data space
    - The systems estimated operating safe state
    - The operator is required to do a state transform in their minds, when they are controlling the grid

Example

- Let me give an example about this
- We start our cars in the morning, we turn the key on
    - And we see the ignition lights and the oil pressure warning lights come up
    - If in failure, the engine stops running
    - We can easily see what's happened
    - Since we know the engine is not running, we get lots of data that tells us that the state of the engine is, not running
        - And the lights should be on if no failure is associated with it
    - In order to see whether the lights are working, we need to decide if the engine is operating
    - We do this all the time
    - It's easy for us
    - We have got lots of data coming in, which helps the cars drive, at least in my car, you can tell if the engine is running pretty easily
- It's different within a control system when working with plants and components
    - And transmission lines that we can't see, we have little data

State Transformations

- We have to do state transforms to understand both the limits and the warnings that we are getting are actually correct
- Until we make an upgrade on control systems, facility upgrade using modern techniques
    - We will always have these problems potentially sitting around in our controls
    - I believe that the problems that we saw are a harbinger of the problems that we are going to see, as our systems become more complex
    - We can deal with an engine on three or four parameters
    - As our systems become more complex, the control problem also becomes more complex
- Assuming we are used to doing state transforms, we rely on it, we do it everyday
    - We are going to cross the road and we see a truck coming on the road
    - We do a state transform on the truck, and if the truck appears to be under control
        - We will stand by the side of the road
    - If it looks like it's about to lose a wheel, we run for our life
    - We survive by doing this because we're so good at this
        - We use it in our control systems too, but the control systems that we are trying to control become more complex and our fundamental ability to carry out these state transforms breaks down

Installation of More Modern Control Techniques

- I believe that the survival of our power systems will require installation of more modern control techniques
    - Sometimes we pride ourselves on the fact that we are conservative in our control mechanisms
    - We've been using a system here that is basically unchanged since the 60s
    - Yet the control problem that we're trying to recognize is vastly more complex
    - There are dangers in using conservative techniques when the underlying problem is rapidly increasing in complexity

Things to Look at to Avoid Future Calamity

- I believe there are two things that we could take a look to correct and avoid this type of problem in the future
- One is a fundamental look at control system techniques that we use
    - Monitoring and control, we have not done for any of our major grid assets
    - We are still happy with the techniques that existed when we first put the systems together
- The second thing is that we could allow or even mandate a mechanism for communicating components', plants', and transmission lines' states
    - And associated characteristics throughout the country and throughout the operators
    - We do this all the time, we give our keys, I give my car keys to my wife, and I am implying a state when I do it
    - If I gave my car keys to my wife that had three flat tires and without gas, she would not receive that transmission extremely well
        - And yet we imply the status when we do handovers to an operator
- We imply that the state of our components are in the condition that they allow us to hand them over
- We need to be more formal about all of the discussion and we need to look at the whole monitoring and control systems on our grid from the control perspective

Jeff Small, Ohio Consumers' Counsel

The OCC

- The OCC is a state agency
  - The OCC is deeply concerned over the human hardships and financial costs associated with the power outage that occurred on August 14
- Residential customers want and deserve reliable service – and pay for the reliable service as part of their rates
- Some of the first solutions proposed following the blackout involved spending vast sums of money
  - Sometimes directed at improving transmission systems
  - And sometimes directed at merely increasing payments to transmission providers
- The contents of the interim report supports very different policies and corrections
- The Task Force deserves credit for producing an informative and readable interim report

Submitting Comments

- The OCC is submitting written comments and those are the same comments that I passed out to you this morning
  - We are submitting comments today by email and these comments are also available on the OCC's website at www.pickocc.org
- The OCC hopes that observations contained in the interim report will be further explained and expanded upon, and that additional issues can be addressed in the Task Force's final recommendations

Reported Causes

- The reported causes of the blackout are:
  - Number one, inadequate tree trimming
  - Number two, inadequate situational awareness
  - And three, inadequate reliability coordinator diagnostic support

Controlling Vegetation near Transmission Lines

- Regarding the control of vegetation near transmission lines
  - Trees are once again involved in a major power outage
- These are mentioned in this interim report regarding four faults on August 14th
  - DP&L Stuart-Atlanta's 345 kV line
  - FirstEnergy's Harding-Chamberlin 345 kV line
  - And Hanna-Juniper 345 kV line
  - And the Star-South Canton 345 kV line
  - The Task Force's investigation suggests that FirstEnergy's stated policies regarding the control of vegetation were not practiced
  - The Task Force should report on the adequacy of the actual vegetation maintenance practices of FirstEnergy

Enforcing Standards

- To some degree it is subject to mandatory enforceable standards regarding the maintenance of their right away

  - They should be held accountable for the harm caused by their inadequate practices
- The interim report's review of multiple causes for the inability of FirstEnergy's control personnel to understand the problems on their systems
  - The interim report questions the adequacy of FirstEnergy EMS alarm system
    - And the Task Force should further examine whether the system should have been replaced prior to August 14 Utilities should be subject to mandatory reporting requirements and inspection of their key control equipment
  - It should be held accountable for the harm caused by inadequate systems

Need for Communication Improvement

- The Interim report states and I quote, 'The most critical factor delaying the assessment and synthesis of clues
  - Was a lack of information sharing between the FirstEnergy system operators'
  - Control room facilities should be subject to inspection and correction to prevent inadequacies from hampering proper communication
- The interim report states that FirstEnergy's controllers were not trained to recognize and respond to emergencies
  - Training of operators must be improved
  - Training should be standardized at higher levels

Other Causes Related to the Lack of Information Sharing

- The Task Force should also consider other causes related to the lack of information sharing
  - Such as the lack of communication between FirstEnergy's computer technology and operating personnel
- The interim report helps to demonstrate that the region left the PJM footprints
  - Including large parts of Ohio that lie in the gap between PJM and the Midwest ISO are poorly served by this current confusion over RTO development
- As the events of August 14th demonstrate
  - The Eastern interconnection is also poorly served by this current confusion over RTO development
  - The Task Force's recommendation should address RTO underdevelopment in Ohio and elsewhere

Summary

- In conclusion, as the investigation into the events of August 14 progresses and recommendations are developed
  - The interests of the consumers who are served by and who paid for reliable transmission service should remain kept paramount
  - We should not focus on building a system that is not needed
- Our comments emphasize that priority should be given to improvements that deal with:
  - Vegetation maintenance
  - Reporting and instruction
  - Training
  - And better management of utility operations
- Operation of transmissions system should be governed by mandatory enforceable standards and utilities should be held accountable for their actions

Richard E. Abbott

Prepared Report

- Enclosed is a report I prepared on:
  - Three related major blackouts
  - Three related interruptions to extra high-voltage transmission lines
  - And resulting wide area blackouts are a new phenomena and were not heard of before 1996

Investigations

- I investigated the line clearing vegetation management practices of Bonneville Power after the two West Coast blackouts in 1996
  - After those blackouts, California, as a result of those blackouts caused by:
    - Tree contacts to extra high-voltage transmission lines
    - Fires, and winter storms
    - Developed regulations mandatory
    - Mandating tree wire clearances

Enforcing Regulations

- There are economic penalties for failure to provide those clearances to comply
- Those regulations are enforced by The California Public Utilities Commission and the Division of Forestry
  - And the company that I founded has about a 150 graduate foresters working in California enforcing those regulations

Estimated Cost of the Blackout

- The August 14 blackout, according to economists, the Corporate Research E-Letter No. 36 [sic: No. 39] cost an estimated $500mm [sic: billion] or one half of 1% of the gross national product
- Republic Engineered Products in Loraine, Ohio lost a blast furnace and this contributed to their filings for Chapter 11 bankruptcy

Reassuring The Task Force

- My resume is attached
  - I have 50 years of experience in the electric utility line clearing vegetation management field
  - I established a utility forestry, urban forestry training, and environmental consulting firm named ACRT Incorporated
    - And am now Chairman of the Board of that business
  - ACRT is registered to do business in 41 states and three Canadian provinces
  - I would welcome the opportunity to assist your Task Force
    - To ensure that there will not be a repeat of the August 14 mishap

Deepak Divan, Chairman of Board, SoftSwitching Technologies Corporation

Company Overview

- We're a high-tech company focused in the area of goods reliability and quality products
- Our investors include GE Capital, JP Morgan Partners and three utilities:
  - Excelon
  - Ontario Power Generation
  - And GTE.

Two Primary Technology

- We have two primary technology and product thrusts
  - That can have a significant impact we believe on good reliability and quality
  - First is an Internet-based power monitoring product
    - We call the I-Grid
  - And second is a new technology that can directly impact the problem of transmission line congestion
- I'm very pleased to have this opportunity to address this committee today
- The August 14 blackout brought into sharp focus an urgent need for modernization of the US power grid

Gaining a Unique Perspective on the Blackout using I-Grid System

- That's vital for achieving reliability and quality levels that are required by today's digital economy
- The Task Force in my mind, have completed a very difficult task, piecing together a complex puzzle
  - And that has given us very good insight into what actually happened on August 14th
- Because SoftSwitching has approximately 200 power monitors that are installed in the impacted area
  - We were able to track the progress of the blackout using the I-Grid system, and gained a unique perspective on the blackout

Sharing our Data with the Task Force

- We responded promptly and we are very pleased to have been invited to share our data with the Task Force
  - Based on the data, I can report the laws of physics still work, and I'm afraid that they will continue to work to our detriment unless we do something to modernize the power grid

Major Contributing Factors for the Cascading Failure

- The Task Force report further verifies that decades of underinvestment in the transmission and distribution infrastructure have resulted in:
  - Ageing equipment
  - Lower operating safety margins
  - And dramatically higher levels of congestion in the transmission system
    - Effectively our energy superhighway

- The report clearly states that
  - The lack of visibility across regions to major system disturbances
  - The lack of redundancy in communication and control systems
  - And the inability to maintain the system operating within safe and reliable limits
    - Were all major contributing factors for the cascading failure
- From a technology perspective, all these issues need to be simultaneously addressed to reduce the possibility of future cascading blackouts

Technology Advances

- Once we assume that the grid needs to be modernized, the question that still remains is, what is the best approach to achieve this?
  - Technology advances in semiconductors and computers and communications have transformed our world today
    - Have provided dramatically lower prices while achieving a thousand-fold improvement in performance

Utility Sector

- Yet, these advances have barely touched the utility sector
  - In today's networked world, most utility customers assume that utilities know when they lose power
  - In fact, most utilities rely on the customer to pick up a phone and call them and tell them that they are without power
  - The same thing occurred on a much larger scale on August 14 as we see from the report
  - Operators in Michigan did not know that multiple 345 kV transmission lines had tripped in Ohio, putting the entire system in jeopardy, as a result of that
  - There is of course a brute force solution to modernization, just put in a brand new infrastructure
  - This is not feasible in my mind

Major Challenges

- The problems and costs are very high, the environmental impact issues and speed of implementation
  - Are all going to be major hurdles there if you are moving in a brute force way
- I think the challenge that we all face is
  - How do we augment and enhance the existing infrastructure
- For good or bad, it already exists, and how do we use the existing transmission lines and corridors
  - So that the modernization can be achieved in a seamless and smooth manner
- To do this cost effectively, one needs to:
  - Leverage the miracles of wireless communications
  - Networking, the Internet
    - And all the examples that have been made in the industrial automation sector
    - And to bring those benefits to bear in the utility sector
- Based on commercially available products and technology such as, some of those we offer from SoftSwitching
  - We believe that much can be done over the next few years to enhance good reliability and quality

- And to begin to reduce the possibility of another cascading outage

Near-Term Technology Initiatives

- I would like to offer some specific, potentially high-impact, near-term technology initiatives for the panel to consider:
  - One, implementation of a grid-status monitoring communication and notification system
    - That operates independently of existing SCADA and EMS systems
    - And that provide inter-regional visibility to power grid status in near real time
  - Two, recommendation for the establishment and enforcement of uniform grid reliability standards
  - Three, the development of environmentally benign solutions that can help review transmission level congestion
    - Thus increasing grid reliability while improving asset utilization
  - Four, create regulatory certainty, allow transmission owners to share in the benefits of competitive market
  - That provides financial incentives, which will drive infrastructure investments
  - And five, work towards rapid implementation of some of these recommended changes so that the possibility of future cascading outages can be minimized

Technology Solutions

- Once again, I appreciate the opportunity to address the panel
- I would like to offer any assistance
- I or SoftSwitching can provide the Task Force as they deliberate on technology solutions:
  - That can modernize the power grid
  - Improve reliability
  - And to reduce the possibility of future blackouts

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

Brief Comments

- There are couple other things that I want to say
- Process, first of all, we will be here for a while
  - If any of you would like to make comments, not now but here in the next few hours, we will continue to be here
- Secondly, all of the comments that we received on electronically will be posted on the Canadian NRCan
  - As well as the DOE websites so that you all and the public can look at those comments, reply if necessary or if you feel that's appropriate
- A transcript of this meeting, as well as the one in New York tomorrow
  - And Toronto on Monday will be available on both of our agency Web sites very shortly, hopefully within a week or so

Recommendations

- And finally, we are – in order to wrap up our recommendation section of this investigation

- We are going to put a limit on when we will accept recommendations, and we would like all recommendations to be in by January 12
- So, hopefully that provides enough time for people
  - To submit initial recommendations, look at comments that have been submitted by others
    - And if they have comments addressing other people's concerns
      - There will be appropriate time to do that

Joseph DeBor

NUREG-0700 Revision 1

- I'm a human factors specialist
- I've been to most of the nuclear plants back in the early days of control room design reviews and it was pretty apparent in this event
  - That situation awareness and diagnostics played a key factor in the event itself
- What, we would like to propose would be a general look at the control room across the grid facilities in the same sense as the nuclear power plants were reviewed back in the 80s
  - There is very specific and very updated criteria to do that
  - That's in NUREG-0700 revision 1, which is electronic – is the electronic human factor control room design with new guidelines
  - It also provides guidelines for doing more extensive operator task analysis during emergency operations
- I think a lot of what goes in the grid world tends to be fair enough:
  - Normal operations
  - Inventorying
  - And prioritizing capacity and the like
    - But it doesn't focus as much on emergency operations as the power plant
    - The nuclear plant have been required to do

Proposing a General Look using NRC Criteria

- So, what I'd like to do is propose a general look at the control room using the criteria that the NRC uses, which is very tried and true and very updated now by Brookhaven Labs in the most recent edition
  - And it looks like there is a need for a lot of a fair amount of automation in the process such as:
    - Automatic reactive power management
    - Automatic warning systems
    - And automatic communications systems across the grid
    - And automated emergency procedures
      - That can pop up and give the operators very specific instructions on what to do
- There is no reason with today's technology to allow operators to put operators in a position of not knowing what the system is doing for an hour
- Certainly the technology is there to solve that problem for them
- Loss of offsite power
  - But, what I'll do is – what I'd like to do is propose control room design reviews and automated systems
  - But we'll provide an electronic – more formal electronic version for you, and I thank you for your time

Rich Scheer, Conference Facilitator

- How appropriate for the lights to go out
- I wonder if that was a coincidence
- Number seven?

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

- Can we hold on for one second please
- There we go

Qadwi Bey, RA Energy International

- Good morning
- My name is Qadwi Bey and I am with a local firm here

Rich Scheer, Conference Facilitator

- Can you spell that please?

Qadwi Bey, RA Energy International

- Q-A-D-W-I; Bey, spelt with an “e” I am with a local company here called RA Energy International
- We are a renewable energy company, and I came today, because I was looking through the interim report and something that stuck out to me, and I wanted to talk about was voltage stability
- The local supply of reactive power is essential to maintain voltage stability and I think that that is something that seriously needs to be addressed, especially when you look at the fact that in a situation such as the blackout, you were looking at things like voltage collapse and you know, you need to be able to have power, near these reactive areas because they only travel short distances and I was wondering if in fact, you know, renewables have been considered in those areas when photovoltaics, geothermal, co. generation to kind of, fit in those areas where these generators have to have power over short distances
- So, in the situation like we had with the blackout if in fact, these types of sources were available, how could they play into the energy picture as we see it, and I would like to also ask, you know, reading in the report, it says not meeting the reliability standard set by NERC.
- I mean it's just blaring that the utilities, where business is usual with no one really checked, you know, like saying, well, you are not even following your own rules, and I think that those areas need to be addressed and the fact that we need to look at renewable sources that are available in a lot of our areas, especially in this area
- I thank you for your time

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

- Thank you

Rich Scheer, Conference Facilitator

- Number eight

Alex Margevicius, Assistant Commissioner, Cleveland Division of Water

- Good morning, Madam and Mr. Chairman and members of the Task Force
- My name is Alex Margevicius
- I am the Assistant Commissioner with the city of Cleveland Division of Water
- The Cleveland Water System is the tenth largest water system in the United States by some measures
- We provide potable water to a million and a half customers, 80% of whom had their service compromised between August 14th until we fully recovered on August 17th
- We have been observing very closely the Task Force's work and the comments that many others have made, and we note what appears to be a disagreement over a major issue, has deregulation led to an overloaded grid that is fundamentally vulnerable and susceptible to these cascading type failures? There are reputable power experts who contend it is, and who further contend that your Task Force has shortsightedly failed to address this instead focusing on the more immediate causes of sagging power lines and failed control systems
- They point out a potential bias in that many on the Task Force represent the very agencies that have promulgated deregulation
- On August 25, 11 days after the blackout, Mike Brown, Director of the Federal Emergency Management Agency, criticized the water industry for not having backup power
- His implication seems to be, “You can't rely on the grid.” The Cleveland Division of Water is faced with $20mm expense to provide sufficient backup generation to survive another complete blackout, and is troubled by the lack of consensus of the experts
- There are many who point to the Columbia shuttle disaster investigation as the type of far-reaching, soul-searching investigation that did not fail to examine the management environment that contributed to the disaster
- I would submit that unless your Task Force addresses the matter of fundamental grid reliability, especially in this era of deregulation, that your report will lack some credibility and may force many into making worst-case assumptions
- Thank you very much

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

- Thank you

Rich Scheer, Conference Facilitator

- Do we have a number nine? Anybody else wish to make some comments? Let me remind you, you can submit your comments in writing, and there are e-mail addresses where you can electronically send your comments
- We have two workstations outside where you can key in comments if you have them, and we obviously have room available for more oral comments

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

- We will again recess until 11:30
- Let me make an announcement, I think at 11:30 if we don't have any more people who have signed up, we will make and announce a call on what we'll do this afternoon
- Obviously, we'll have individuals or we'll have the computer workstations here that would still be able to take comments, but we will make a call so that everybody doesn't have to sit here all afternoon if there are not going to be any additional speakers
- Thank you

James Glotfelty, Director, Office of Electric Transmission and Distribution, US Dept. of Energy

- I'd like to make an organizational announcement, and that is just that we are going to stay here until noon
- We're going to continue to have a workstation out in front with folks around helping if you'd like to submit electronic comments
- But, knowing that over the last hour, we haven't had any additional people want to speak publicly
- We'll at least provide the opportunity out front, now with that being said, I will ask, has anybody else come in now that would like to speak publicly? Okay, we will move on to New York around noon
- Thank you